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Jianbo Lu

81095822

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Dickinson Wright PLLC
38525 Woodward Avenue
Suite 2000
Bloomfield Hills, MI 48304

EXAMINER

SY, MARIANO ONG

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JIANBO LU, HONGTEI E. TSENG, and DAVOR D. HROVAT

Appeal 2007-4503
Application 10/708,670
Technology Center 3600

Decided: April 30, 2008

Before WILLIAM F. PATE, III, JENNIFER D. BAHR, and
DAVID B. WALKER, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Jianbo Lu et al. (Appellants) appeal under 35 U.S.C. § 134 from the Examiner's decision rejecting claims 1-49. We have jurisdiction over this appeal under 35 U.S.C. § 6 (2002).¹

Appellants' claimed invention is directed to a system and method for improving parkability of a vehicle by integrating a brake-steer system with a chassis control device (e.g., adjustable suspension) that can adjust the normal force at each of the four wheels of a vehicle. Specification ¶¶ [0008, 0009]. Appellant describes "brake-steer or brake-steering" as "changing a characteristic of the vehicle such as the turning radius or tracking of the vehicle using one or more brakes, the application of differential (positive or negative) torques, or a combination of the braking and differential torques." Specification ¶ [0042]. By adjusting the normal forces at selected wheels, the brake-steer effect can be further enhanced and/or maximized. For example, the vehicle can be made more prone to neutral-steer/over-steer at higher speed. When combined with brake-steer, adjusting normal forces at selected wheels can further improve the turning radius of the vehicle. Specification ¶ [0014]. The amount of brake-steer may be modified based on the normal forces at each wheel. Specification ¶ [0106].

Claims 1, 25, and 29 are illustrative of the invention and read as follows:

1. A method of controlling an automotive vehicle having wheels comprising:
 - detecting a parking mode;

¹ We refer in this opinion to the Examiner's Answer mailed March 27, 2007, the Appeal Brief filed December 8, 2006, and the Reply Brief filed March 30, 2007.

in the parking mode, applying brake-steer at a first wheel to reduce a vehicle turning radius; and

simultaneously with the step of applying brake-steer, increasing a normal load on at least one of the wheels.

25. A method of controlling an automotive vehicle having vehicle wheels comprising:

detecting a parking mode;

detecting a vehicle loading condition; and

applying brake-steer to the vehicle wheels in response to the parking mode and the vehicle loading condition.

29. A method as recited in claim 25 wherein detecting a normal load condition comprises determining a loading response to a wheel speed and throttle signal.

The Rejections

The Examiner relies upon the following as evidence of unpatentability:

Fukushima	US 4,903,983	Feb. 27, 1990
Urvoiy	US 5,307,888	May 3, 1994
Nakamura	US 5,408,411	Apr. 18, 1995
Mine	US 5,515,277	May 7, 1996
Krueger	US 6,481,806 B1	Nov. 19, 2002
Wessman	US 6,612,394 B2	Sep. 2, 2003

The following rejections under 35 U.S.C. § 103(a) are before us for review.

- (1) Claims 1-6, 8-10, 12, 14-20, 22, 23, 25, 26, 28, 30-32, 34, 35, 37²-39, 41-44, and 47 stand rejected as unpatentable over Wessman in view of Fukushima.
- (2) Claims 7, 21, 33, 40, 45, 46, and 49 stand rejected as unpatentable over Wessman in view of Fukushima and Krueger.
- (3) Claims 11, 24, and 27 stand rejected as unpatentable over Wessman in view of Fukushima and Urvoy.
- (4) Claims 13 and 36 stand rejected as unpatentable over Wessman in view of Fukushima and Mine.
- (5) Claims 29 and 48 stand rejected as unpatentable over Wessman in view of Fukushima and Nakamura.

OPINION

Rejection (1)

Appellants argue the rejection of independent claims 1, 14, and 34, and the claims depending therefrom, together as one group and the rejection of independent claims 25 and 41, and the claims depending therefrom, as a second group. Therefore, in accordance with 37 C.F.R. § 41.37(c)(1)(vii), we select claims 1 and 25 as the representative claims to decide the appeal of this rejection, with claims 2-6, 8-10, 12, 14-20, 22, 23, 34, 35, and 37-39 standing or falling with claim 1, and claims 26, 28, 30-32, 41-44, and 47 standing or falling with claim 25.

² The rejection of claim 37 was a new ground in the Examiner's Answer. *See* Answer 2. Appellants respond to this new ground in the Reply Brief, pointing out that the arguments set forth in the Brief with respect to claims 1-6, 8-10, 12, 14-20, 22, 23, 25, 26, 28, 30-32, 34, 35, 38, 39, 41-44, and 47 apply to the rejection of claim 37. Reply Br. 2.

Claim 1

The Examiner finds that Wessman discloses a system comprising means for detecting a parking mode, i.e., the vehicle being stationary or being turned at relatively low speed (col. 2, ll. 11-15 and 51-62), and a controller 10 programmed to apply brake-steer to at least one wheel to reduce a turning radius (col. 2, ll. 5-20). Answer 4. The Examiner finds that Wessman lacks disclosure of determining vehicle loading condition and increasing normal loading using an active suspension on at least one rear wheel. *Id.* The Examiner finds Fukushima teaches applying brake-steer and increasing normal load and controlling an active suspension on at least one wheel (abstract and col. 3, ll. 19-26). *Id.* The Examiner determines it would have been obvious to combine brake-steer and increasing normal loading using an active suspension, as taught by Fukushima, in order to improve driving stability of the vehicle during turning or cornering. *Id.*

Appellants argue that Wessman does not teach or suggest detecting a parking mode and that Wessman does not teach or suggest increasing a normal load on a vehicle wheel during brake-steer. Appeal Br. 4. Appellants further argue that neither reference teaches detecting a parking mode and simultaneously with the step of applying brake-steer increasing a normal load on at least one of the wheels. *Id.* Appellants' arguments appear to attack each of Wessman and Fukushima individually rather than as combined by the Examiner. Nonobviousness cannot be established by attacking the references individually when the rejection is predicated upon a combination of prior art disclosures. *See In re Merck & Co. Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). The issue before us is whether the combined teachings of Wessman and Fukushima establish that a method of controlling

an automotive vehicle comprising detecting a parking mode and, simultaneously with the step of applying brake-steer, increasing a normal load on at least one of the wheels, as called for in claim 1, would have been obvious.

In accordance with Appellants' disclosed invention, the parking mode may be determined by using various combinations of sensors such as "a combination of the wheel speed sensor and the steering angle sensor." Specification ¶ [0098]. When in a parking mode, a vehicle typically is driven at a very low velocity, with the steering wheel turned sharply to direct the vehicle into the parking space. Thus, a person of ordinary skill in the art³ would understand Appellants' disclosure of determining a parking mode using a combination of the wheel speed sensor and the steering angle sensor to mean that a parking mode is detected when both a low wheel speed and a sharp turn angle are detected.

Wessman utilizes wheel speed sensors 3a, 3b, 4a, 4b and a steering angle sensor 5 to detect whether the steering wheel is turned to or near its maximum limit and, if so, whether the vehicle is moving at a velocity less than a predetermined limit. If both of these conditions are met, Wessman transmits a signal to actuate braking on the wheel on the side of the vehicle toward the inside of the turn to reduce the turning radius of the vehicle (col. 2, ll. 11-18 and 51-62; col. 3, l. 64 to col. 4, l. 27). While Wessman does not use the terminology "parking mode," we find that a person of ordinary skill

³ "A person of ordinary skill is also a person of ordinary creativity, not an automaton." *KSR Int'l. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1742 (2007). Additionally, an artisan must be presumed to know something about the art apart from what the references disclose. See *In re Jacoby*, 309 F.2d 513, 516 (CCPA 1962).

in the art would understand the detection of both of these conditions to constitute detecting a parking mode, in the same manner as Appellants' disclosed step of detecting a parking mode using a combination of the wheel speed sensor and steering angle sensor. We therefore find that Wessman discloses detecting a parking mode. Wessman additionally teaches, when in the parking mode, applying brake-steer by actuating braking on the wheel on the side of the vehicle toward the inside of the turn to reduce the turning radius of the vehicle, as required in the second step of claim 1.

Fukushima teaches stiffening the suspension systems for wheels located remote from the center of the corner, thereby increasing a normal load on those wheels, and softening suspension systems for wheels located close to the center for suppressing vehicular rolling in order to assure traction at the respective wheels (col. 4, ll. 63-68). It would have been obvious to combine such suspension control with the brake-steer system of Wessman, such that both suspension control (increasing normal load on at least one of the wheels) and braking force to reduce turn radius are applied when Wessman detects the steering wheel angle is at or near its limit and the vehicle is traveling below a predetermined speed (parking mode detection) to obtain the combined advantages of both suspension control and brake-steer for better turn control during parking.⁴ Such an improvement is nothing more than the predictable use of prior art elements according to their established functions. *KSR*, 127 S.Ct at 1740.

⁴ "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR*, 127 S.Ct at 1739.

For the foregoing reasons, Appellants' arguments do not persuade us the Examiner erred in rejecting claim 1 as unpatentable over Wessman in view of Fukushima. We sustain the rejection of claim 1 and claims 2-6, 8-10, 12, 14-20, 22, 23, 34, 35, and 37-39, which stand or fall with claim 1.

Claim 25

Appellants argue that although Fukushima teaches changing a vehicle load, Fukushima does not teach or suggest detecting a vehicle loading condition and applying brake-steer to the vehicle in response to the parking mode and the vehicle loading condition. Appeal Br. 5. For the following reasons, we do not find this argument persuasive of reversible error in the Examiner's rejection.

We note, at the outset, that while the requirement of demonstrating a teaching, suggestion, or motivation (the TSM test established by the Court of Customs and Patent Appeals) to combine known elements in order to show that the combination is obvious may be "a helpful insight," it cannot be used as a rigid and mandatory formula. *KSR*, 127 S.Ct. at 1741. While there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness, "the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *Id.*

As discussed above, Wessman teaches applying brake-steer upon detection of a parking mode. Additionally, for the reasons discussed above with regard to claim 1, we conclude that it would have been obvious to combine the suspension control of Fukushima with the brake-steer system of Wessman, such that both suspension control (increasing normal load on at

least one of the wheels) and braking force to reduce turn radius are applied when Wessman detects the steering wheel angle is at or near its limit and the vehicle is traveling below a predetermined speed (parking mode detection) to obtain the combined advantages of both suspension control and brake-steer for better turn control during parking. Fukushima teaches detecting a vehicle loading condition (col. 6, ll. 45-52). The vehicle loading information (from sensors 24, 25, 26) is input into the suspension controller 30, and the suspension stiffnesses are controlled in response to those inputs (col. 7, ll. 5-13; fig. 3). Fukushima (abstract, col. 9, l. 44 to col. 11, l. 52) recognizes that steering and normal loading on the vehicle are closely interrelated in regard to determining the cornering characteristics (over-steer, under-steer, drift, traction, etc.). Fukushima also recognizes that a vehicular steering operation results in exertion of lateral force on the vehicle body to generate lateral acceleration (col. 9, l. 66 to col. 10, l. 1). Thus, a person of ordinary skill in the art, in applying brake-steer and suspension control in response to the parking mode being detected, would have been prompted by the combined teachings of Wessman and Fukushima to also take into account the vehicle loading condition (e.g., lateral acceleration) in determining how much, if any, brake-steer and suspension control is needed to achieve the desired cornering characteristics. Stated differently, the combined teachings of Wessman and Fukushima would have fairly suggested the step of applying brake-steer to the vehicle wheels in response to the parking mode and the vehicle loading condition, as called for in claim 25.

We sustain the rejection of claim 25 and claims 26, 28, 30-32, 41-44, and 47, which stand or fall with claim 25.

Rejections (2) through (4)

Appellants simply rely on their arguments with respect to the rejection of claims 1 and 25 in contesting rejections (2) through (4), urging that the Examiner's application of the additional teachings of Krueger, Urvoy, and Mine does not make up for the perceived deficiencies in the combination of Wessman and Fukushima. Appeal Br. 5-6. For the reasons discussed above with respect to rejection (1), we do not find these arguments persuasive. We thus sustain the rejections of claims 7, 21, 33, 40, 45, 46, and 49 as unpatentable over Wessman in view of Fukushima and Krueger; claims 11, 24, and 27 as unpatentable over Wessman in view of Fukushima and Urvoy; and claims 13 and 36 as unpatentable over Wessman in view of Fukushima and Mine.

Rejection (5)

Claims 29 and 48 require determining a normal load condition comprising determining a loading response to a wheel speed and throttle signal. Fukushima teaches determining vehicle loading using a lateral acceleration sensor 24, transmission gear position sensor 25, and throttle angle sensor 26 (col. 6, l. 45 to col. 7, l. 13). Neither Wessman nor Fukushima specifically teaches using a wheel speed and throttle signal to determine a normal load condition.

The Examiner relies on Nakamura for a teaching of determining a loading condition using, *inter alia*, wheel speed sensors and a throttle angle sensor (col. 32, ll. 35-62) and determines it would have been obvious to utilize such a known means of determining a loading condition in the system of Wessman, as modified in view of Fukushima, in order to improve the

vehicle's stability during turning. Answer 7. Nakamura uses a variety of inputs from sensors, including wheel speed sensors, steering angle information, throttle valve angle sensor, and braking pressure information, to assess vehicular behavior and to control cornering based on that vehicular behavior (col. 32, ll. 1-17).

Appellants argue Nakamura does not teach determining a wheel loading response or condition based on sensed wheel speed and throttle signal for the purpose of aiding parking maneuvers. Rather, according to Appellants, Nakamura is concerned with, and teaches, methods of avoiding spinning, drifting, and understeer, which are all undesirable high-speed handling characteristics. Appeal Br. 6. We do not find Appellants' argument persuasive of reversible error in the Examiner's rejection. While the cornering characteristics alluded to by Appellants may be undesirable high-speed characteristics, they are likewise undesirable handling characteristics for parking. Wessman, in particular, recognizes the need to reduce the turning radius (to over-steer, or avoid under-steer) of a vehicle during low speed turning. We sustain the rejection of claims 29 and 48 as unpatentable over Wessman in view of Fukushima and Nakamura.

CONCLUSION

The decision of the Examiner to reject claims 1-49 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

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Appeal 2007-4503
Application 10/708,670

DICKINSON WRIGHT PLLC
38525 WOODWARD AVENUE
SUITE 2000
BLOOMFIELD HILLS, MI 48304